

1

## FLASH CHAMBER WITH A SELF CLOSING VALVE FOR USE WITH A CATHETER

### CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

This application claims priority from U.S. Provisional Application Ser. No. 60/208,690, filed Jun. 1, 2000, which application is incorporated herein by reference in its entirety.

### BACKGROUND

The present invention relates to a flash chamber with a self-closing valve for use with a catheter. The flash chamber precludes blood leakage as a catheter needle is removed from the catheter and an IV unit is coupled to the catheter.

Intravenous (IV) procedures are commonly used in the medical arts to deliver medications and other fluids to patients. Typically, the IV procedure is initiated by having a needle encircled by a catheter or plastic sleeve pierce a patient's skin. The needle and catheter are then inserted into a vein or artery to provide the practitioner with access to the circulatory system. The needle is then removed from the catheter, and an IV line is attached to a terminal hub.

When the needle, which is commonly attached to a syringe, is within the catheter a positive pressure is applied against the blood coursing through the punctured vein or artery so that blood remains in the blood vessel. However, once the needle is removed from the catheter and before the IV line is attached to the hub blood can freely flow from the punctured vessel through the catheter. The blood exiting the catheter obscures the working area and exposes the practitioner to direct contact with the patient's blood.

Because intravenous procedures are so common and important in the medical arts, it would be advantageous to have an IV catheter assembly designed to keep the blood from exiting through the catheter when the needle is removed and before the IV line is attached. Preferably the design should be relatively simple, thereby reducing the possibility of a failure of the system, and should be capable of being used with the current IV lines without the need for adapters.

### SUMMARY OF THE PREFERRED EMBODIMENT

The present invention is for a flash chamber with a self-closing valve for use with a catheter. The flash chamber precludes blood leakage as a needle is removed from the catheter and an IV unit is coupled to the catheter. The flash chamber is connected to the catheter, and is adapted to receive the IV line. The flash chamber permits the practitioner to visually verify that a blood vessel has been punctured and includes a self-sealing valve that prevents blood from flowing out of the flash chamber as the needle is removed and the IV unit is attached. A stylus extends into the flash chamber and is positioned such that the stylus can be made to protrude through the valve placing the catheter in fluid communication with the IV unit.

### DESCRIPTION OF FIGURES

FIG. 1 is a perspective view of a catheter assembly including a flash chamber with a self-closing valve made in accordance with the present invention;

FIG. 2 is a cross-sectional side view of the catheter assembly of FIG. 1 with the stylus withdrawn and the pathway closed;

FIG. 3 is a cross-sectional side view of the catheter assembly of FIG. 1 with the stylus protruding through the diaphragm, thereby leaving the pathway open;

2

FIG. 4 is a cross-sectional side view of the catheter assembly of FIG. 1 with the stylus protruding through the diaphragm and with a needle protruding through the catheter;

FIG. 5 is cross-sectional side view of the catheter assembly of FIG. 1 with the stylus removed from the diaphragm and with a needle protruding through the catheter;

FIG. 6 is a cross-sectional side view of the first housing of the flash chamber; and

FIG. 7 is a cross-sectional side view of the second housing of the flash chamber.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The catheter assembly including a flash chamber with a self-closing valve depicted in the various Figures is selected solely for the purposes of illustrating the invention. Other and different catheter assemblies and flash chambers may utilize the inventive features described herein as well.

Reference is first made to FIGS. 1 through 5 in which the catheter assembly including a flash chamber with a self-closing valve constructed in accordance with the present invention is generally noted by the character numeral 10. The catheter assembly 10 has as major components a flash chamber 14, a self-closing valve 50, and a catheter 12. The catheter 12 is a hollow sleeve 11 with a hub 13, as is known in the art. The self-closing valve 50 is a diaphragm with sufficient resiliency that fluids, such as blood, cannot leak through the slit when it is closed. In a preferred embodiment, the diaphragm 50 is made of self-sealing elastomeric materials so that the diaphragm "closes" when it is in a resting state. Further, in a preferred embodiment, the diaphragm 50 is pre-slit minimizing the risk of creating shreds from the diaphragm material as the catheter 12 and needle are forced through the diaphragm 50.

As shown in FIGS. 2-7, the flash chamber 14 includes a first housing 20 and a second housing 30. The housings 20, 30 can be manufactured from any material which can produce a semi-rigid device and which can retain the shape of the device during sterilization procedures. Because the practitioner may wish to see blood flowing into and through the housings 20, 30, optionally, the housings 20, 30 can be manufactured from an essentially translucent material. However, translucency of the material is not required for the flash chamber to function as intended.

The first housing 20 has a receiver end 22 which is adapted to reversibly receive the catheter 12, and a valve end 24 which is threaded 28 on the exterior surface. An essentially centered bore 26 extends longitudinally through the housing 20 from the receiver end 22 to the valve end 24. When the catheter 12 is attached to the first housing 20, as shown in FIGS. 2-5, the bore 26 is in fluid communication with the catheter sleeve 11. The bore 26 has a port or a section with an enlarged diameter 27 at the valve end 24 proportioned such that the self-sealing valve or diaphragm 50 can fit snugly within the port 27.

As shown in FIGS. 2-7, the second housing 30 has an attachment end 32 with a threaded core 31, a connector 34, and a stylus 36. The attachment end 32, and more particularly the threaded core 31, is adapted to engage the threads 28 of the valve end 24 of the first housing 20. The threaded core 31 has sufficient length that the threads 28 of the first housing 20 can be screwed into the core 31 until the attachment end 32 of the second housing 30 abuts the receiver end 22 of the first housing 20 as shown, for example, in FIG. 2. The connector 34, which extends